CLAIMS

What is claimed is:

1. An electrical bus system comprising:

a first conductive bus element defining a first electrical reference plane extending substantially contiguously between a terminal for a first conductor coupled directly to power electronic switching circuitry and terminals for an energy storage or filtering circuit;

a second conductive bus element defining a second electrical reference plane extending substantially contiguously between the terminals for a second conductor coupled directly to the power electronic switching circuitry and the terminals for the energy storage or filtering circuit;

at least one insulative layer disposed intermediate the first and second bus elements to electrically isolate the elements from one another;

wherein the first and second bus elements extend generally in parallel between the respective terminals to reduce parasitic inductance during operation

2. The bus system of claim 1, wherein the bus elements and the insulative layer form a laminate structure.

3. The bus system of claim 1, further comprising at least one additional insulative layer disposed adjacent to the first or the second bus element for electrically isolating the bus element from adjacent components.

4. The bus system of claim 1, wherein the first bus element and the insulative layer include recesses for accessing connection areas of the second bus element.

5. The bus system of claim 1, wherein the first and second bus elements include integral connection areas for electrically coupling the bus system to power electronic switching circuitry for three phases of ac power.

6. An electrical bus system comprising:

a first conductive bus element defining a first electrical reference plane extending substantially contiguously between a terminal for a first conductor coupled directly to power electronic switching circuitry and terminals for an energy storage or filtering circuit;

a second conductive bus element defining a second electrical reference plane extending substantially contiguously between a terminal for a second conductor coupled directly to the power electronic switching circuitry and the terminals for the energy storage or filtering circuit;

an inner insulative layer disposed intermediate the first and second bus elements to electrically isolate the elements from one another; and

first and second outer insulative layers disposed adjacent to the first and second bus elements, respectively, opposite the inner insulative layer, to electrically isolate the elements from other components;

wherein the first and second bus elements extend generally in parallel between the respective terminals to reduce parasitic inductance during operation.

7. The bus system of claim 6, wherein the bus elements and the insulative layers are contoured to conform to at least one support on which the power electronic switching circuitry and energy storage or filtering circuit are mounted.

8. The bus system of claim 6, wherein the bus elements and the insulative layers form a laminate structure.

9. The bus system of claim 6, wherein the first bus element and the insulative layers include recesses for accessing connection areas of the second bus element.

10. The bus system of claim 6, wherein the first and second bus elements include integral connection areas for electrically coupling the bus system to power electronic switching circuitry for three phases of ac power.

11. An electrical bus system comprising:

a first conductive bus element defining a first electrical reference plane extending substantially contiguously between a terminal for a first conductor coupled directly to power electronic switching circuitry and terminals for an energy storage or filtering circuit;

a second conductive bus element defining a second electrical reference plane extending substantially contiguously between a terminal for a second conductor coupled directly to the power electronic switching circuitry and the terminals for the energy storage or filtering circuit;

an inner insulative layer disposed intermediate the first and second bus elements to electrically isolate the elements from one another; and

first and second outer insulative layers disposed adjacent to the first and second bus elements, respectively, opposite the inner insulative layer, to electrically isolate the elements from other components;

wherein the first and second bus elements extend generally in parallel between the respective terminals to reduce parasitic inductance during operation, and wherein the bus elements and the insulative layers form a laminate structure and are contoured to conform to at least one support on which the power electronic switching circuitry and energy storage or filtering circuit are mounted.

12. The bus system of claim 11, wherein the first bus element and the insulative layers include recesses for accessing connection areas of the second bus element.

13. The bus system of claim 11, wherein the first and second bus elements include integral connection areas for electrically coupling the bus system to power electronic switching circuitry for three phases of ac power.

14. A power electronic switching device comprising:

power electronic switching circuitry having a plurality of terminals;

first and second conductors coupled directly to the terminals of the switching circuitry;

an energy storage or filtering circuit having a plurality of terminals; and

an electrical bus system comprising a first conductive bus element defining a first electrical reference plane extending substantially contiguously between the first conductor and the terminals for the energy storage or filtering circuit, a second conductive bus element defining a second electrical reference plane extending substantially contiguously between the second conductor and the terminals for the energy storage or filtering circuit, and at least one insulative layer disposed intermediate the first and second bus elements to electrically isolate the elements from one another, wherein the first and second bus elements extend generally in parallel with one another between the respective conductors and terminals.

15. The device of claim 14, wherein the bus elements and the insulative layer form a laminate structure.

16. The device of claim 14, further comprising at least one additional insulative layer disposed adjacent to the first or the second bus element for electrically isolating the bus element from adjacent components.

17. The device of claim 14, wherein the first bus element and the insulative layer include recesses for accessing connection areas of the second bus element.

18. The device of claim 14, wherein the first and second bus elements include integral connection areas for electrically coupling the bus system to power electronic switching circuitry for three phases of ac power.

19. The device of claim 14, wherein the bus elements each comprise integral connection areas for electrically coupling the bus elements and the terminals of the energy storage or filtering circuit to a source of dc power.

20. A power electronic switching device comprising:

power electronic switching circuitry having a plurality of terminals and configured to receive dc input power and to generate ac output power;

conductors coupled directly to the terminals of the power electronic switching circuitry;

an energy storage or filtering circuit having a plurality of terminals and configured to be coupled to a source of dc power; and

a dc bus system comprising a first conductive bus element defining a first electrical reference plane extending substantially contiguously between a first set of the conductors and the terminals for the energy storage or filtering circuit, a second conductive bus element defining a second electrical reference plane extending substantially contiguously between a second set of the conductors and the terminals for the energy storage or filtering circuit, and at least one insulative layer disposed intermediate the first and second bus elements to electrically isolate the elements from one another, wherein the bus elements each comprise integral connection areas for electrically coupling the bus elements to the conductors, and to the terminals of the energy storage or filtering circuit and the source of dc power, wherein the first and second bus elements extend generally in parallel with one another between the respective conductors and terminals to substantially reduce the parasitic inductance and total loop inductance in the device.

21. The device of claim 20, wherein the bus elements and the insulative layer form a laminate structure.

22. The device of claim 20, further comprising at least one additional insulative layer disposed adjacent to the first or the second bus element for electrically isolating the bus element from adjacent components.

23. The device of claim 20, wherein the first bus element and the insulative layer include recesses for accessing connection areas of the second bus element.

24. The device of claim 20, wherein the first and second bus elements include integral connection areas for electrically coupling the bus system to power electronic switching circuitry for three phases of ac power.

25. A method for reducing parasitic inductance in a power electronic switching device, the method comprising:

defining a first substantially contiguous electrical reference plane of a dc bus for coupling between a first conductor directly coupled to a power electronic switching circuitry and terminals for an energy storage or filtering circuit;

defining a second substantially contiguous electrical reference plane of the dc bus for coupling between a second conductor directly coupled to the power electronic switching circuitry and the terminals for the energy storage or filtering circuit, the second electrical reference plane extending parallel to the first reference plane to reduce inductance in the device during operation; and

electrically isolating the first and second reference planes from one another.

26. The method of claim 25, further comprising electrically isolating the reference planes from adjacent components of the device.

27. The method of claim 25, comprising laminating the reference planes with at least one isolating layer to form a laminated structure.

28. The method of claim 25, further comprising providing integral connection areas of the reference planes for coupling the reference planes both to a source of dc power and to the terminals of the energy storage or filtering circuit.

29. The method of claim 25, further comprising contouring the reference planes and an intermediate isolation layer to conform to a support.

30. A system for reducing parasitic inductance in a power electronic switching device, the system comprising:

means for defining a first substantially contiguous electrical reference plane of a dc bus for coupling between a first conductor coupled directly to a power electronic switch and terminals for an energy storage or filtering circuit;

means for defining a second substantially contiguous electrical reference plane of the dc bus for coupling between a second conductor coupled directly to the power electronic switch and the terminals for the energy storage or filtering circuit, the second electrical reference plane extending parallel to the first reference plane to reduce inductance in the device during operation; and

means for electrically isolating the first and second reference planes from one another.